SELECTIVE POSITIONING OF ARBOREAL TENTS BY WEAVER ANTS *OECOPHYLLA SMARAGDINA* (F.): A POSSIBLE CO-EVOLUTIONARY DEVELOPMENT WITH MAHA-DAN TREES, *SYZYGIUM CUMINI* (L.)SKEEIS

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Abstract

Weaver ants *O. smaragdina* locate their tents preferentially near the inflorescences of flowering Maha-dan trees (*S.cumini*). As the fruits complete development nutrient sources for the ants at these sites are probably reduced; the tents are gradually abandoned. During development however, the fruits are protected by the presence of *O. smaragdina.* A coevolution of *O. smaragdina* with *S. cumini,* surprisingly the first indicated for the completely arboreal ant, is suggested by these data.

Introduction

The two extant species of weaver ants of the genus *Oecophylla* [*O. longinoda* (Latr.) in Africa and *O. smaragdina* in S.E. Asia and Melanesia] are famed for their construction of arboreal tents made from leaves bound together with larval silk (Holldobler and Wilson 1977). Little information is available concerning the biology of *O. smaragdina* (Hemmingsen 1973) but that of *O. longinoda* has been described in detail by Ledoux (1950) and Way (1954) and the social behaviour of this species has been the subject of detailed research (Holldobler and Wilson 1978). In addition to building their main nests both species build silken tents around major food sources (usually concentrations of honey producing scale insects tended by the ants). This event is described as rare in *O. longinoda* (Ledoux 1950) while Dodd (1902) recorded tents of *O. smaragdina* as common around fruits and berries of *Ficus* and *Terminalia* spp. in northern Australia.

This note records the selective positioning of tents of *S. smaragdina* on inflorescences in maha-dan trees (*Syzygium cumini*) in Sri Lanka and provides some evidence suggesting a possible co-evolutionary development between the species involved.

Methods

The observations were made during two brief visits to the sand-dune area near Yala bungalow at the mouth of the Menik Ganga, S.E. Sri Lanka (6°24′N 81°30′E). One visit to the study tree, growing 100 m from the sea, was made in early August, the second 2-4 weeks later at the height of the dry season (May-September). The tree was divided into five equal sections, each covering the full height of the tree and the number of tents built on inflorescences, leaves and branches noted.

Results

The number of tents in these locations at the first visit is given in Table 1. As no significant differences were found between sections these were pooled and a significantly greater number of tents was found on inflorescences relative to other sites (χ^2 = 20.22 d.f. = 2, $P < 0.001$). About 80% of the inflorescences on the tree were associated with ant tents.

The drop in proportion of fruits with tents as the fruits ripen is shown in Table 2. This is statistically significant (χ^2 = 10.01, d.f. = 2, $P < 0.01$) despite the small sample size. These results suggest the hypothesis that the ants, attracted to the nectar produced by the flowers, serve to protect these and subsequently the developing fruit. At some stage after the disappearance of the nectar resource the ants cease to maintain the tent and by the time the fruits have fully developed and are ready to be dispersed, the ants have gone and fruit eaters have unhindered access to the fruit.

TABLE 1

The number of *O. smaragdina* nests located on fruit clusters, leaves or branches of *S. cumini*. Counts are given separately for the five sections into which the tree was divided for observational purposes.

	1	2	3	4	5	Total
Fruits	4	3	4	3	5	19
Leaves	1	2	1	3	1	8
Branch	0	0	0	0	0	0

TABLE 2

The number of ripe (all fruit black), unripe (all fruit green) and ripening (black and green fruit) bunches of fruit on the tree, and the proportion of each type occupied by an *O. smaragdina* nest.

	Unripe	Ripening	Ripe
Number with ants	3	8	0
Number without ants	0	3	5
Proportion occupied	1.00	0.73	0.00

Discussion

Silken tents are usually built around herds of scale insects and Dodd (1902) noted the high densities of these on the fruits around which tents were built. No scale insects were seen in the present case, but they are inconspicuous and could well have been missed. The fact that the tent was built in the body of the inflorescence often leaving individual flowers outside the silk webs suggests that although nectar was certainly taken directly from the cup-like receptacles of the flowers, much of the resource tapped by the ants may have been indirectly obtained from scales which can extract nutrients from the phloem in the stems of the growing fruit. This nutrient supply would only reduce close to the full ripening of the fruit and the ants would remain on the inflorescence throughout the period of ripening.

That the association described above has undergone some degree of coevolution beyond an initial accidental mutualism is shown by differences in the behaviour of the ant on *S. sumini* from that previously recorded for *O. smaragdina.* First, the resource was not entirely enclosed in the tent, some flower heads being left free. Second, butterflies, flies and bees were seen to visit the flowers outside the tent and were not attacked by the ants. Both species of *Oecophylla* have been recognised as voracious predators of other insects (usually hemipterans but beetles, butterflies, other ants, spiders, bees and even young birds are taken) and they obtain a significant proportion of their food from this source (Ledoux 1950, Way 1954). Clearly the latter behaviour would reduce pollination of the host plant and has been modified on Maha-dan trees (at least during the flowering season).

The genus *Oecophylla* is entirely arboreal and has had a long evolutionary history in this habitat (Wilson and Taylor 1964). This note is the first record of a possible coevolution between *O. smaragdina* and one of the tree species it inhabits.

These Sri Lankan data are of particular interest in relation to the Australian situation because of the widespread occurrence of *Oecophylla smaragdina* in northern Australia, and previous records of fruit-nest associations in that area (Dodd 1902). It is hoped that publication of the Sri Lankan data will stimulate further research on the possibility of *Oecophylla*/plant coevolution in Australia.

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